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EXAMINER

KERNS, KEVIN P

ART UNIT

PAPER NUMBER

1793

MAIL DATE

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/579,442	<b>Applicant(s)</b> NUMANO ET AL.	
	<b>Examiner</b> Kevin P. Kerns	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 January 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 10-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 May 2006 and 27 January 2009 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "52" (Figure 3C). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

2. Claim 6 is objected to because of the following informalities: in the last line of the claim, delete ",", after "16.7". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (US 6,173,755) in view of JP 5-318040 (cited in applicants' IDS dated 5/15/06).

Regarding claims 1, 2, and 7-9, Li et al. disclose a casting nozzle having multiple layers of differing materials (see column 2, lines 50-67; column 3, lines 1-67; column 4, lines 1-11 and 44-67; column 5, lines 1-20 and 54-67; column 6, lines 1-67; Example 1; and Figures 1, 5, and 9), in which the casting nozzle (20,120) supplies molten metal 40 (aluminum or aluminum alloys) from a tundish (container 11,111) to a movable mold (multiple pairs of rolls 134 and continuous belts 112 in the continuous casting apparatus 110 of Figure 9, or alternatively, with roll casters comprising a movable mold pair of rolls – column 6, lines 66-67), in which the nozzle (20,120) is fixed to the tundish (11,111) that stores molten metal 40, such that the tip of the casting nozzle (20,120) includes

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multiple layers of differing materials that comprise resilient insulating layers (26,126) that are elastic and thermally insulating, such as PYROTEK (which has a heat conductivity of 0.19-0.26 W/mK, and less than 0.2 W/mK at temperatures below 500 C – as set forth in the material data sheets referenced by the applicants on page 6 of the remarks section of the amendment dated March 12, 2008) and a layer of (highly heat conductive carbon) graphite (27,127) in the form of a flexible (elastic) foil having a thickness of 0.01 inch (0.254 mm) at the casting nozzle tip portion 24 (Figure 5).

Regarding claims 2-4, the casting nozzle tip portion 24 arranged on the movable mold side (in this instance, graphite layer (27,127) of 1.8 g/cm<sup>3</sup>, as cited in Table I on page 27 of the applicants' specification – see paragraph [0039]) is a high density layer of >0.7 g/cm<sup>3</sup>, and has a high strength layer (graphite layer (27,127) of 25.5 MPa in Table I) of tensile strength of >10 MPa.

Regarding claims 2, 5, and 6, the casting nozzle tip portion 24 arranged on the movable mold side (graphite layer (27,127)) has a highly elastic layer of elastic modulus of >5,000 MPa (Table I recites that graphite has a value of 9,800 MPa), and has a highly heat-conductive layer having a heat conductivity of >16.7 W/mK) – Table I recites that graphite has a significantly higher value of 120 W/mK.

Li et al. do not disclose that the high heat-conductive layer (>16.7 W/mK) is arranged on the molten/liquid (metal) side of the nozzle and deformability of the elastic layer of the casting nozzle tip upon making close contact with the movable mold.

However, JP 5-318040 discloses a device (nozzle) for sealing molten metal on a cooling casting roll 14 (abstract; and Figures 1-3), in which the nozzle includes a

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(elastic) ceramic fiber felt layer 20 (low heat conductivity) and a metal strip 30 (high heat conductivity of  $>16.7$  W/mK, including Mo of 142 W/mK, SUS 304 steel (paragraph [0018]), and SUS 316 steel of 16.7 W/mK) interposed between the (elastic) ceramic fiber felt layer 20 and cooling roll 14 (molten/liquid metal side of the nozzle) so that the tip portion of the nozzle retreats (elastically deforms while in contacting engagement with the casting roll 14) by 1-5 mm for the tip part of the pouring nozzle, for the purpose of preventing leakage of molten metal and preventing formation of defects in the cast product of a continuous casting process (abstract).

It would have been obvious to one of ordinary skill in the art at the time the applicants' invention was made to modify the casting nozzle having multiple layers of differing materials, as disclosed by Li et al., by using the multiple layer nozzle having a high heat-conductive layer on the molten/liquid metal side of the nozzle and deformability of the elastic layer of the casting nozzle tip upon making close contact with the movable mold, as taught by JP 5-318040, in order to prevent leakage of molten metal and to prevent formation of defects in the cast product of a continuous casting process (JP 5-318040; abstract).

### ***Response to Arguments***

6. The examiner acknowledges the applicants' amendment and replacement drawing sheets received by the USPTO on January 27, 2009. The replacement drawing sheets removed three of the reference numbers, but not "52" (see above section 1). The amendments overcome prior objections to the specification and claim 6,

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but a new objection to claim 6 is raised in above section 2. Claims 10-14 remain withdrawn from consideration as drawn to non-elected inventions. Claims 1-9 remain under consideration in the application.

7. Applicants' arguments filed January 27, 2009 have been fully considered but they are not persuasive.

With regard to the applicants' remarks/arguments on pages 8-10 of the amendment, the applicants provided three major arguments regarding the 35 USC 103(a) rejections (Li in view of JP '040) of claims 1-9, in particular in addressing independent claims 1 and 2.

First, the applicants argue (in the 3<sup>rd</sup> paragraph on page 8 of the remarks section) that the *"metal strip 30 of JP '040 is disposed between the ceramic fiber felt layer 20 and the cooling roll 14...but is not arranged on the molten liquid side, as required by claim 1. What is disposed on the molten liquid side in JP '040 is the ceramic fiber felt layer 20..."*. Importantly, the applicants state (in the 3<sup>rd</sup> full paragraph on page 9 of the remarks section) that *"JP '040 discloses only one cooling roll, not a pair of rolls."*. The examiner agrees that JP '040 only discloses one cooling roll, so the continuous casting of metal strip would therefore be conducted between the casting roll and the nozzle (rather than between two rolls in a twin-roll casting process). As a result, the molten metal contacts the metal strip 30 and the cooling roll 14, such that metal strip 30 is arranged on the molten liquid side, thus meeting the claim 1 limitation disputed by the applicants.

Second, the applicants argue (in the 2<sup>nd</sup> paragraph on page 9 of the remarks section) that the elastic “*graphite layer 27,127 of Li contacts the casting belt 12,112...In contrast, the casting tip nozzle of claim 2 is arranged in contact with **the pair of rolls**...” Although the figures cited by applicants show contact between the nozzle and belts driven by rolls, it is important to note that Li discloses that the nozzle is operable to be used in combination with other types of continuous casters, including roll casters (column 6, lines 62-67) that are beltless in the casting region, thus providing roll contact rather than belt contact in such continuous casters. Furthermore, the nozzle of JP ‘040 is in contact with a single cooling roll 14, and would readily be provided in contact with a pair of rolls, which is already contemplated by Li (column 6, lines 62-67). Thus, the teachings of Li, as well as the disclosed nozzle contact with the cooling roll of JP ‘040, would meet the claim 2 limitation disputed by the applicants.*

Third, the applicants argue (throughout page 10 of the remarks section) that it would not have been obvious to combine Li with JP ‘040 to arrive at the subject matter of the claims. The examiner respectfully disagrees, and it is also noted that these particular arguments address the combination of low and high thermal conductivity materials common to independent claim 1, but not applied to independent claim 2. Importantly, both Li and JP ‘040 contemplate the combination of low and high thermal conductivity materials in continuous casting processes using casting rolls. JP ‘040 discloses and/or suggests the feature of the high heat-conductive layer (>16.7 W/mK) being arranged on the molten/liquid (metal) side of the nozzle (as set forth in addressing the applicants’ first argument above), for the purpose of preventing leakage of molten



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metal and preventing formation of defects in the cast product of a continuous casting process (JP '040; abstract). Throughout page 10 of the remarks section, the applicants argue that JP '040 (as taken individually) does not render obvious its combination with Li, and restates its teachings as in the first argument (which is incorrect in view the material contacting the molten liquid side). In response to applicants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). As a result, claims 1-9 remain rejected.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin P. Kerns whose telephone number is (571)272-1178. The examiner can normally be reached on Monday-Friday from 8:00am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Art Unit 1793

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Primary Examiner, Art Unit 1793  
March 5, 2009